

CORALLINALES OF MALVINAS ISLANDS: BIOLOGICAL CHARACTERISTICS

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ABSTRACT - Recent studies on Corallinales of Malvinas Islands concluded that crustose calcareous algae are more abundant than geniculate ones. *Hydrolithon* represents 53% of the specimens with four species (*H. consociatum*, *H. discoideum*, *H. falklandicum*, *H. subantarcticum*); *Pseudolithophyllum* 21,8% with one taxon (*P. fuegianum*); *Synarthrophyton* 12,3% with two species (*S. neglectum*, *S. patena*); *Clathromorphum* (5,8% with three species (*Cl. lemoineanum*, *Cl. annulatum*, *Cl. variabile* comb. nov.); *Mesophyllum* 4,9% with one species (*M. fuegianum*); *Bossiella* 1,1% with one taxon (*B. orbigniana* ssp. *orbigniana*); *Corallina* 1,1% with two species (*C. officinalis*, *C. elongata*). These taxa present a characteristic vertical distribution in both intertidal and subtidal.

RESUMEN - El estudio de las Corallinales de las Islas Malvinas reveló una marcada abundancia de las algas calcáreas incrustantes en relación con las geniculadas. El género *Hydrolithon* con cuatro especies (*H. consociatum*, *H. discoideum*, *H. falklandicum*, *H. subantarcticum*) representa el 53% de los ejemplares estudiados; *Pseudolithophyllum* con un taxón (*P. fuegianum*) el 21,8%; *Synarthrophyton* con dos especies (*S. neglectum*, *S. patena*) el 12,3%; *Clathromorphum* con tres especies (*Cl. lemoineanum*, *Cl. annulatum*, *Cl. variabile* comb. nov.) el 5,8%; *Mesophyllum* con un taxón (*M. fuegianum*) el 4,9%; y los géneros de las geniculadas, *Bossiella* con una subespecie (*B. orbigniana* ssp. *orbigniana*) el 1,1% y *Corallina* con dos especies (*C. officinalis*, *C. elongata*) el 1,1% de los ejemplares. De estas taxas se presentan ■ principales caracteres y ■ distribución vertical.

RÉSUMÉ - L'étude des Corallinales des Iles Malouines montre une abondance évidente des algues encroûtantes par rapport à celles qui sont geniculées. C'est ainsi que sur la totalité des exemplaires étudiés les algues encroûtantes sont représentées par *Hydrolithon* avec quatre espèces (*H. consociatum*, *H. discoideum*, *H. falklandicum*, *H. subantarcticum*) 53%. *Pseudolithophyllum* avec un taxon (*P. fuegianum*) 21,8%. *Synarthrophyton* avec deux espèces (*S. neglectum*, *S. patena*) 12,3%. *Clathromorphum* avec trois espèces (*Cl. lemoineanum*, *Cl. annulatum*, *Cl. variabile* comb. nov.) 5,8%, *Mesophyllum* avec un taxon (*M. fuegianum*) 4,9%, tandis que les algues geniculées ne sont représentées que par *Bossiella* avec une espèce (*B. orbigniana* ssp. *orbigniana*) 1,1% et *Corallina* avec deux espèces (*C. officinalis*, *C. elongata*) 1,1%. Les caractéristiques de la distribution verticale de ces espèces sont présentées.

KEY WORDS - Corallinales, Malvinas Is., biology.

INTRODUCTION

Foslie (1905, 1906, 1907) and Lemoine (1913, 1915, 1920) were the first specialists who studied the Corallinales of Malvinas Islands. Specimens had been collected during the antarctic expeditions. Lemoine (1915) also examined specimens collected by Mrs. Vallentin in Malvinas Islands in 1910.

First identifications were based on the morphological character, vegetative anatomy and number of pore of the conceptacles of the specimens. Other authors such as Harvey (1847), Hariot (1889) and Cotton (1915), who were not specialists in coralline algae based their identifications on the external morphology only.

Moreover Skottsberg (1923, 1941), Levring (1944, 1960) and other authors only mention the calcareous taxa described by Foslie and Lemoine.

Since 1970 research has taken into account the retroductive characters and the thallus morphogenesis. This new method brought about a new classification of the genera. Consequently the results obtained were highly different from those of the early century. Some of the new results can be seen in Mendoza (1976, 1979, 1988, 1990a, 1990b), Mendoza & Cabioch (1984, 1985, 1986a, 1986b), Mendoza & Molina (1993) when studying the subantarctica Corallinales.

The present work emphasizes the peculiarities of the corallines algae of the Malvinas Islands.

Malvinas is an archipelago formed by two main islands and more than 220 islets. The eastern one is Soledad island (6306 km²) and the western one is Gran Malvina (4532 km²). San Carlos Strait run between them. The islands are located in the South Atlantic Ocean between 51° and 53°S and 62°W, approximately at 565 km eastwards the Magellan Strait (Fig. 1).

The coast shape is irregular. There are deep fjords with steep walls, peninsulas, exposed capes or little bays sheltered from the heavy winds. Beaches are sandy, slimy or pebbly.

The weather is cold and wet, with mean temperatures getting to 9°C in summer and 2°C in winter and maximum temperatures rising to 24°C in summer (January) and 8° in winter (July). Seawater temperature is 2-4°C in winter and 8-10°C in summer, and it is influenced by the cold-current of Malvinas.

Winds are frequent and strong, annual mean velocity reaches 16 miles per hour. Annual rainfall average is 365 mm; drizzle is constant through the year.

In summer, daylight is remarkably longer than in winter (6 am to 11 pm and 10 am to 5 pm respectively). Days are frequently cloudy.

MATERIAL AND METHODS

Samples were collected in November 1980, June and February 1981 at low tide: Stanley Port, Hooker Point, Yorke Point, Eliza Cove Cristina Bay, Fish Rock, San Luis Port, Seal Cove and Pembroke Cape.

Specimens are fixed in 4% seawater in neutral formol; histological section were done according to Cabioch (1972).



Fig. 1: geographic and phytogeographic location of Malvinas Islands.

The percentage of genera was determined by the addition of studied specimens. Squares of 25 cm by 25 cm were used in order to state the abundance of each genera, and the following parameters were established: dominant species that cover 100% to 80% of the square; abundant 80% to 40%, frequent 40% to 10% and rare 10% to 1% of the whole (surface) covering.

For control, the type specimens housed in Paris (PC) and Trondheim (TRH) herbarium were (also) examined.

RESULTS

1 - The abundance of coralline algae (Rhodophyta) in Malvinas Islands gives a distinctive physiognomy to the vegetation. Some genera of this order cover the lower intertidal and subtidal.

2 - Seven genera containing 13 species and one subspecies have been identified.

3 - Identified taxa are: *Bossiella*, *B. orbignana* (Dcne.) Silva 1957 ssp. *orbigniana*; *Corallina*, *C. elongata* Eil. et Sol. 1786, *C. officinalis* L. 1758; *Clathromorphum*, *Cl. annulatum* (Fosl.) Mendoza 1990b, *Cl. lemoineanum* Mendoza et Cabioch 1984, *Cl. variabile* (Fosl.) Mendoza et Molina comb. nov.¹; *Hydrolithon sensu* Mendoza et Cabioch 1986b, *H. consociatum* (Fosl.) Mendoza 1979, *H. discoideum* (Fosl.) Mendoza et Cabioch 1984, *H. falklandicum* (Fosl.) Mendoza 1979, *H. subantarcticum* (Fosl.) Mendoza et Cabioch 1985; *Mesophyllum*, *M. fuegianum* (Fosl.) Adey 1970; *Synarthrophyton*, *S. neglectum* (Fosl.) Mendoza 1990a, *S. patena* (Hooker fils et Harv. in Harv.) Townsend 1979, and *Pseudolithophyllum sensu* Mendoza et Cabioch 1984, *P. fuegianum* (Heydr.) Mendoza et Cabioch 1984.

4 - These taxa may be grouped into three morphological types as follows: a- encrusting, orbiculate thick thallus with or without small protuberances, *Pseudolithophyllum fuegianum*, *Hydrolithon consociatum*, *H. discoideum* and *Clathromorphum variabile*; b- semicircular or thin circular laminar thallus, *Synarthrophyton patena* and *Mesophyllum fuegianum*; c- thin coalescent irregular encrusting thallus, *Hydrolithon subantarcticum*, *Clathromorphum annulatum* and *Cl. lemoineanum*.

5 - In most of the non-geniculate species, the epithallus is formed by several layers of cells: *Clathromorphum annulatum*, *Cl. lemoineanum*, *Cl. variabile*, *Hydrolithon consociatum*, *H. discoideum*, *H. falklandicum*, *H. subantarcticum* and *Pseudolithophyllum fuegianum*. Only three species have an epithallus formed by a single layer of rounded cells: *Mesophyllum fuegianum*, *Synarthrophyton patena* and *S. neglectum*. The perithallus is highly developed in most cases, nearly occupying all the thallus. Only in three species, the perithallus is as thick as the hypothallus: *Mesophyllum fuegianum*, *Synarthrophyton patena* and *S. neglectum*. The hypothallus is generally unistratose. The five most abundant species in these coasts that have the hypothallus formed by a single layer of cells are: *Hydrolithon consociatum*, *H. discoideum*, *H. falklandicum*, *H. subantarcticum* and *Pseudolithophyllum fuegianum*. There are three species where the hypothallus is made up by 2 or 3 layers of cells: *Clathromorphum annulatum*, *Cl. lemoineanum* and *Cl. variabile*.

6 - Generally speaking within one species 70% are tetrasporophytes, 20% female gametophytes and 10% male gametophytes.

7 - Seaweeds are vertically distributed in the coast. *Hydrolithon falklandicum* and *Synarthrophyton neglectum* are located from the middle lower intertidal to the bottom.

H. subantarcticum, *H. discoideum* and *Cl. annulatum* are abundant in the upper subtidal, while at the same place *Clathromorphum lemoineanum*, *Corallina officinalis* and *C. elongata* are rare, and *Pseudolithophyllum fuegianum* is dominant.

¹ *Clathromorphum variabile* (Fosl.) Mendoza et Molina comb. nov.

Basionym: *Lithothamnion variabile* Fosl. Alg. Not. II, p. 10, 1906. Crustaceous thallus, external surface with protuberances, firmly attached to rocks. Hypothallus composed of 3 to 8 layers of cells, rectangular cells, 20-35 µm long x 7-9 µm in diameter. Perithallus rectangular rounded cells, 12-15-17 µm long x 6-9 µm in diameter and with common cell fusions. Epithallus composed of 3-4 layers of small cells. Asexual multiporate conceptacle, elliptical chambers, 350-450 µm in diameter x 100-120 µm high. Sexual conceptacle not known.

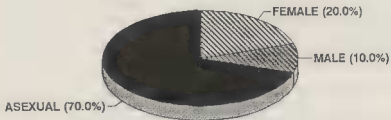


Fig. 2: diagrammatic representation of the relative abundance of sexual and asexual thalli.

	INTERTIDAL	SUBTIDAL
BOSSIELLA B. orbigniana ssp. orbigniana		—————
CORALLINA C. elongata C. officinalis	—————	-----
CLATHROMORPHUM Cl. annulatum Cl. lemoineanum Cl. variabile		----- ----- —————
HYDROLITHON H. consociatum H. discoideum H. falklandicum H. subantarcticum	—————	----- ----- -----
MESOPHYLLUM M. fuegianum		—————
SYNARTHROPHYTON S. neglectum S. patena	—————	----- —————
PSEUDOLITHOPHYLLUM P. fuegianum		—————

Fig. 3: vertical distribution of Corallinales.

The margins of the lower intertidal pools are completely covered by *Hydrolithon falklandicum* and *Synarthrophyton neglectum*. In the middle of the poolwalls *H. discoideum*, *Clathromorphum annulatum* and *Cl. lemoineanum* are abundant. While, *Pseudolithophyllum fuegianum*, *H. consociatum*, *Cl. variabile* and *Mesophyllum fuegianum* are covering the floor (Fig. 3).

CONCLUSION

1 - In Malvinas the remarkable presence of Corallinales (Rhodophyta) and other species, *Macrocystis pyrifera* (L.) C. Ag., *Lessonia nigrescens* Bory and *Durvillaea antarctica* (Chamisso) Hariot, gives a distinctive physiognomy to the vegetation.

2 - The abundance of calcareous algae in Malvinas Islands is determined by the high number of specimens of the same species and by a great specific diversity.

The crustose Corallinales are more abundant than the geniculate ones. The genus *Hydrolithon* with 4 species (*H. consociatum*, *H. discoideum*, *H. falklandicum* and *H. subantarcticum*) is dominant and represents 53% of the observed specimens; *Pseudolithophyllum* with one species (*P. fuegianum*) is very abundant and represents 21,8%. The genus *Synarthrophyton* with two species (*S. neglectum* and *S. patena*) is abundant and represent 12% of these algae. *Clathromorphum* with 3 species (*Cl.*

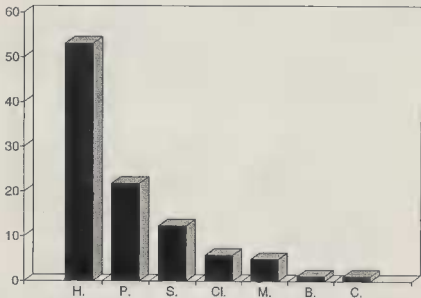


Fig. 4: Graphic of genera abundance, Y: % of abundance; X: genera (H= *Hydrolithon*; P= *Pseudolithophyllum*; S= *Synarthrophyton*; Cl= *Clathromorphum*; M= *Mesophyllum*; B= *Bossiella*; C= *Corallina*).

annulatum, *Cl. lemoineanum*, and *Cl. variabile*) represents only 5,8%; and the genus *Mesophyllum* with one species (*M. fuegianum*) 4,9% (Fig. 4).

Geniculate Corallinales algae represent only 2,2% of the specimens; 1,1% belongs to *Corallina* with 2 species (*C. elongata* and *C. officinalis*) and the other 1,1% to the genus *Bossiella*, with one subspecies (*B. orbigniana* ssp. *orbigniana*) (Fig. 4).

3 - All the non-geniculate or encrusting species are particularly characteristic and exclusive of the cold waters of the southern Hemisphere.

The geniculate, *Bossiella orbigniana* ssp. *orbigniana* and *Coralina elongata*, are found in both hemispheres; *C. officinalis* is a cosmopolitan species.

4 - Some species of Corallinales show a well-defined bathymetric distribution: *Hydrolithon falklandicum* inhabits only the middle intertidal; *Bossiella orbigniana* ssp. *orbigniana*, *Clathromorphum variabile*, *H. consociatum* and *Pseudolithophyllum fuegianum* appear in the subtidal and the other species are found in the lower intertidal (Fig. 3).

5 - These characteristics of the Corallinales combined with the presence of other algae like *Macrocystis pyrifer*, *Lessonia nigrescens*, *Durvillaea antarctica* confirm the phytogeographic insertion of the seaweeds of Malvinas Islands in the Fuegian Ocean Province (Kühnemann, 1972) (Fig. 1).

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